Properties of Water and Cycles Study Guides

Define the following terms:

**Density**

*How much matter is in a given space for any substance*

**Specific Heat Capacity**

*This tells us how hard it is change the temperature of a substance*

**Freezing Point**

*The temperature that a substance changes to a solid*

**Boiling Point**

*The temperature that a substance changes to a gas*

**Cohesion**

*The attractive forces between a single substance (ex. water attracts to other water molecules)*

**Adhesion**

*The attractive forces between two substances (ex. water attracts to glass)*

**Surface Tension**

*The film-like effect on the surface of water that makes it feel like the surface of water is almost a solid*

1. Why is water considered to be a polar molecular?

*The oxygen end is slightly negative and the hydrogen end is slightly positive*

1. What are hydrogen bonds and why are they responsible for many of the properties of water?

*They are bonds between the positive side of water and the negative side of water. These are very strong bonds that are responsible for the high specific heat capacity, cohesion, and adhesion.*

1. What happens when solid water (ice) is placed in liquid water? Why is this unique? What causes this?

*It floats. The liquid form of water is denser than the solid form of water. This is unique to water and is caused by hydrogen bonds.*

1. Why is cohesion an important property of water?

*It allows water molecules to stick together and cause surface tension.*

1. Why is adhesion an important property of water?

*It allows water to stick to other substances and is responsible for water flow through plants.*

1. Why is water’s high specific heat capacity important?

*Water is able to store energy and is resistant to changes in temperature.*

Water Cycle

Explain the following parts of the water cycle:

**Evaporation**

*Energy from the sun causes the water to change to a gas and it goes up into the atmosphere.*

**Condensation**

*Water vapor cools back to a liquid in the much colder atmosphere where it forms clouds.*

**Precipitation**

*When the clouds store too much water they eventually release it in the form of rain, snow, sleet, or hail. The water falls back to the ground.*

**Collection**

*Precipitation falls back down from the atmosphere it gets collected by large bodies of water, the ground (ex. soil), and animals.*

Draw a picture showing all these steps in the water cycle:

*(Look in your notes)*

1. What is another name for the water cycle?

*Hydrological Cycle*

1. What happens when clouds collect too much water?

*Rain, snow, sleet, or hail falls from the sky (precipitation)*

1. What is needed to form clouds besides water vapor?

*Dust or dirt for the water molecules to collect around.*

1. What are some different types of precipitation?

*Rain, snow, sleet, hail*

1. What are some different things that will collect water after it falls from the sky?

*Oceans, lakes, rivers, soil, plants*

1. What are some ways the water cycle is important to life on Earth? Explain.

*It helps maintain water levels in oceans, lakes and rivers. It helps plants and animals get water. It helps keep proper water levels in the ground and soil. It recycles water through the ecosystem.*

Nitrogen Cycle

1. Why is nitrogen gas in the atmosphere not usable for plants and animals?

*In the form N2, the gas is not reactive and can’t be used.*

1. What are the three ways nitrogen can be fixed to change it from nitrogen gas into usable nitrogen compounds?

*Nitrogen gas can get struck by lightening and then get brought down through rain, special plants can fix it themselves (they have bacteria in their roots), bacteria in the soil fix the nitrogen and release it into the soil.*

1. Why is nitrogen important to life?

*It is needed to form amino acids, proteins, DNA. Plants also need it for chlorophyll.*

1. What type of organism is responsible for most of the nitrogen fixation?

*Bacteria*

1. How does nitrogen get back into the air after plants and animals use it?

*Other bacteria break down nitrogen in dead plants and animals and release it back into the air.*

1. Draw the nitrogen cycle

*(See notes)*

1. Starting with nitrogen gas with the air, explain how nitrogen would go through the nitrogen cycle and end up back in the air. (There is more than one possible path for this)

*One possible example:*

*Nitrogen from the air gets turns into nitrogen compounds through bacteria in the soil. These bacteria release these nitrogen compounds into the soil. Plants take these compounds using their roots and it helps them to grow. Animals eat these plants. When the animals die they decompose into the soil. Bacteria help to decompose these dead animals and turn the nitrogen compounds in the animal back into nitrogen gas. They release this gas back into the air.*

Carbon Cycle

1. Why is carbon considered the building block of life?

*It is used to make fats, proteins, and carbohydrates.*

1. Explain the role that photosynthesis and respiration play in the carbon cycle. Draw a diagram.

*Plants take in carbon dioxide gas and use it to make glucose (this contains a lot of carbon).*

*Animals eat the food created by plants (which contains a lot of carbon) and then breath out carbon dioxide gas, which goes back into the atmosphere.*

1. What are areas that store carbon over long periods of time? Give two examples.

*Carbon sinks, such as oceans and forests.*

1. What is the carbon compound that occurs naturally in the air?

*Carbon Dioxide*

1. What organisms play an important role in the breakdown of dead carbon-based material and the creation of fossil fuels?

*Bacteria*

1. Why does burning fossil fuels put extra carbon compounds into the environment?

*Fossils fuels contain a lot of carbon compounds. When fossil fuels are burned it releases carbon dioxide into the air through the process of combustion.*

1. What are the three main types of fossil fuels? What do we use fossil fuels for?

*Coal, natural gas, and oil. We use them for transportation, heat, generating electricity, and cooking.*

1. What are two ways we can help to limit the amount of extra carbon that gets put into the environment? Explain.

*Reducing the amount of fossil fuels we use will help to put less carbon dioxide in the air. Reducing the amount of trees we cut down will allow these trees to remove carbon dioxide from the air.*

1. Starting with carbon in the atmosphere, trace the path of a carbon molecule through the carbon cycle. (There is more than one possible path)

*On example: Plants take in carbon dioxide from the air undergo photosynthesis to make glucose. Animals then eat the plants and undergo respiration. They then release carbon dioxide. When the plants and animals die, bacteria will help to decompose them and release carbon compounds into the soil.*